L. L. NARAYANA* & D. RAO*: Contributions to the floral anatomy of Humiriaceae 1

L. L. ナラヤナ*・D. ラオ*: Humiriaceae の花部解剖学的研究 1

The Humiriaceae include three genera, *Humiria*, *Sacoglottis* and *Vantanea* and 20 species (Hutchinson, 1959). Recently Cuatrecasas (1961) revised the family and included the following eight genera; *Vantanea*, *Duckesia*, *Endopleura*, *Hylocarpa*, *Humiria*, *Sacoglottis*, *Schistostemon* and *Humiriastrum* and they are spread over 49 species. Members of this family are mainly distributed in the tropical forests of South America and only *Sacoglottis gabonensis* occurs in West Africa. The plants are woody shrubs or trees with simple, alternate leaves and bisexual, regular flowers. The fruit is a drupe and the seeds are endospermic.

There is no published account on the floral anatomy of Humiriaceae except for a short note by Rao & Narayana (1965) on the floral anatomy of *Sacoglottis uchi* (=*Endopleura uchi* (Huber) Cuatr.). The present paper deals with the floral anatomy of three species of *Vantanea*, viz., *V. parviflora* Lam., *V. macrocarpa* Ducke., and *V. minor* Benth.

Material and methods Herbarium material of the flower buds of *V. parviflora* and *V. minor* was obtained from the Director, Royal Botanic Gardens, Kew; and of *V. macrocarpa* from the Director, Botanic Gardens, Rio de Janeiro. The procedure followed for processing the material is the same as described by Narayana (1964) for *Durandea* of the Linaceae. Sections cut at 10–12 microns of thickness were stained in crystal violet with erythrosin as a counter stain.

Morphology of the flower The flowers are pedicellate, pentacyclic, pentamerous, dichlamydeous, heterochlamydeous, regular, bisexual and hypogynous (Figs. 1, 6, 11, 19, 28, 36, 47), The five sepals are united below but free above (Figs. 5, 6, 24, 43–46) and show quincuncial aestivation in *V. macrocarpa* and *V. minor* (Figs. 24, 28, 47). In *V. parviflora* the calyx tube is short and the limbs are suppressed (Figs. 1, 5, 6). The polypetalous

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corolla shows contorted aestivation (Figs. 6, 11, 25–28, 44–47). The androecium consists of numerous stamens united at the base (Figs. 8, 27, 28, 46). The dithecous anthers are dorsifixed (Figs. 1, 19, 36). In all the investigated species the four microsporangia are fertile (Figs. 2, 18). The ovary is 5-carpellary, syncarpous and 5-locular with two superposed ovules in each loculus (Figs. 1, 12, 19, 29, 36). The loculi are antisepalous (Figs. 11, 28, 47). The ovary becomes unilocular towards the top (Figs. 16, 32, 50). In *V. parviflora* one flower showed a 6-carpellary ovary (Figs. 13, 14). The semi-solid style shows a stylar canal lined by transmitting tissue (Figs. 1, 17–19, 33–36, 51–52). The glandular stigmas are 5-lobed. There is a massive, annular disc adnate to the base of the staminal tube in *V. macrocarpa* and *V. minor* (Figs. 19, 27, 36, 45, 46). In *V. parviflora,* it is cup-shaped and adnate to the base of the ovary (Figs. 1, 8, 9).

Floral anatomy The stele in the pedicel, in *V. parviflora,* shows six vascular bundles arranged in a ring (Fig. 3). In the thalamus region they unite to form a closed ring of vascular tissue from which the sepal midrib traces and the common sepal lateral traces arise in one whorl (Fig. 4). They branch repeatedly to form numerous small bundles and they traverse the calyx tube (Figs. 4–6). Further in this species the petal midrib traces and the common petal lateral traces arise in one whorl (Fig. 5). In *V. macrocarpa* and *V. minor* the pedicel shows ten bundles of two sizes (Figs. 20, 37). The larger bundles function as the conjoint sepal midrib—petal lateral traces (Figs. 20–22, 37–40). From each conjoint bundle, lateral traces of the petals are formed to the inside (Figs. 22, 39). The outer bundle forms the sepal midrib (Figs. 22, 39). The common sepal lateral traces arise from the smaller bundles of the main stele (Figs. 21, 22, 39). At a higher level the five petal midrib traces depart along the same radii (Figs. 22, 40). The lateral traces of the petals swing along the sides and come to lie on either side of the petal midrib bundles (Figs. 22, 23, 40, 41). Thus, the lateral traces of petals arise conjointly with the sepal midrib traces, while the petal midrib traces arise independently (Figs. 21, 22, 39, 40).

After the perianth traces are organized, numerous staminal traces arise at successive levels (Figs. 6, 7, 24, 25, 42, 43). The staminal traces undergo chorisis resulting in a larger number of staminal bundles (Figs. 6–8, 24–27, 42–44), which enter the base of the staminal tube. The inner portion of the staminal tube where these bundles are smaller, functions as the disc and it soon separates into a distinct structure (Figs. 27, 28, 45, 46). In *V. parviflora* the outer part of the staminal tube first separates from the inner part, which functions as the disc. The disc now, appears as adnate to the base of the ovary and at the same time receives some more traces from the main stele (Figs. 1, 8).

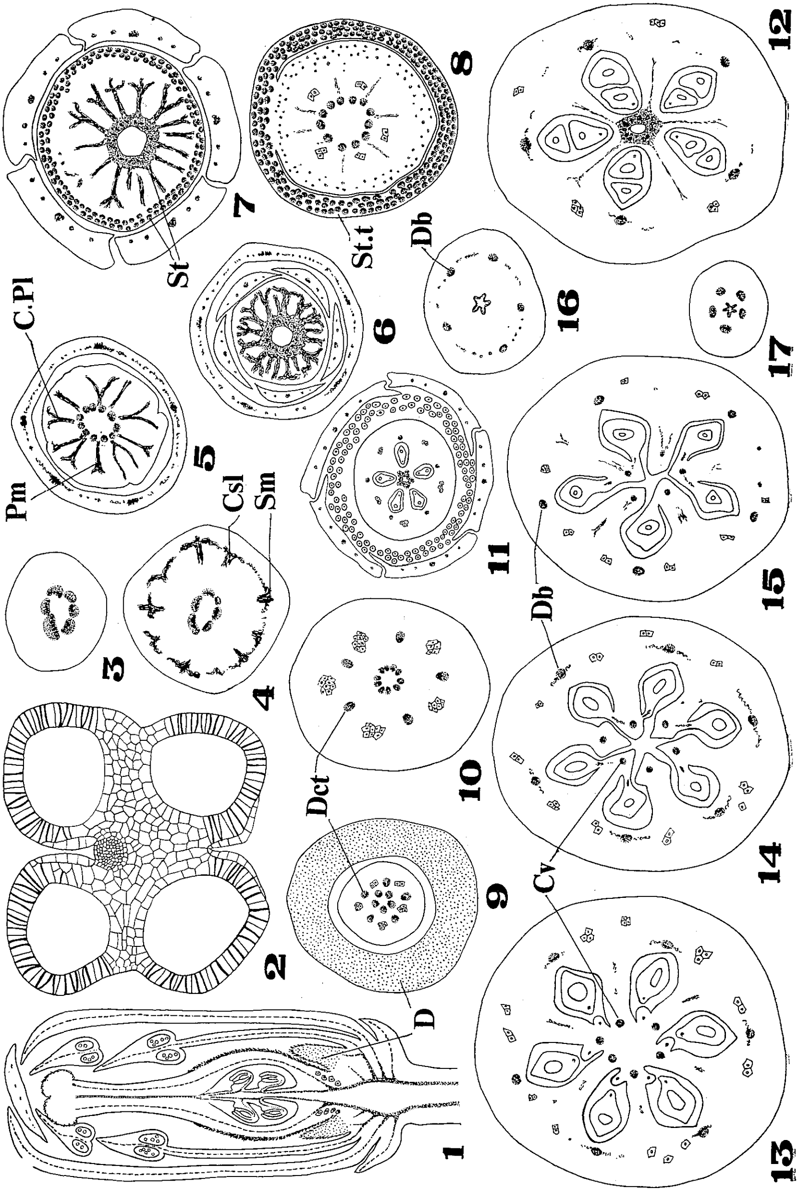
After the departure of the staminal traces, five dorsal carpellary traces are organised along the sepal radii (Figs. 9–11, 26, 45). At a higher level the dorsal carpellary bundles in *V. parviflora* and *V. macrocarpa* divide to give rise smaller bundles which supply the ovary wall (Figs. 12–14, 30). The remaining stele in *V. parviflora* and *V. minor* forms five or six common ventral bundles (Figs. 13, 46). In *V. macrocarpa,* the ring-like stele organises into five pairs of ventral bundles along the sepal radii (Figs. 27–29), and they later fuse in pairs to form the common ventral bundles (Fig. 30). The traces given off from the common ventral bundles supply the ovules in adjacent loculi (Figs. 14, 15, 30, 31, 48, 49). Above the level of origin of ovular traces the ventral bundles give off branches which traverse the septa and enter the ovary wall, and they terminate at the top of the ovary (Figs. 15, 16, 31, 32, 49, 50). In *V. macrocarpa* and *V. parviflora* groups of thick walled, sclerenchymatous cells are seen at the base of the ovary and extend above along the base of the septa (Figs. 1, 8–15, 26–31).

Summary and conclusions The flower is pentacyclic, pentamerous, regular, bisexual and hypogynous. The quincuncial sepals are 3-traced and the calyx is gamosepalous. Lateral traces of adjacent sepals arise conjointly. Adnation between sepal midrib and common petal lateral traces is noticed in *V. macrocarpa* and *V. minor.*

The free petals are 3-traced. The petal median traces arise independently. In *V. parviflora,* the common petal lateral traces do not show adnation with sepal midrib traces.

The androecium is multistaminate and monadelphous. The larger number of stamens and chorisis of staminal traces seen in these species recalls the fasciculate condition of the androecium in Dilleniales (Eames, 1961; Wilson, 1965).

The intra-staminal disc is present in all the species. Floral anatomy of these species throws light on the morphology of the disc. The stamens are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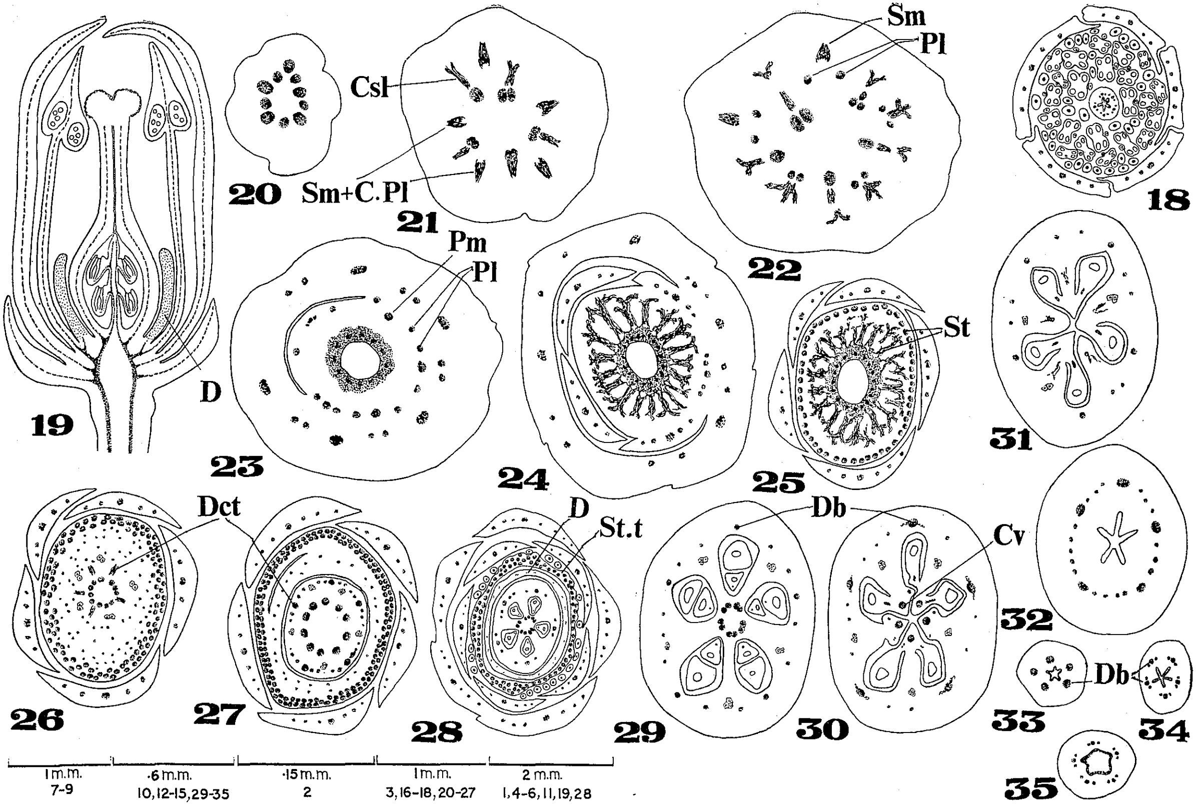
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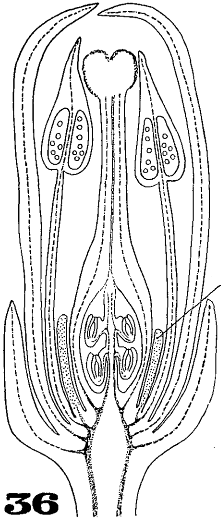

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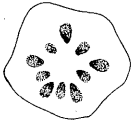

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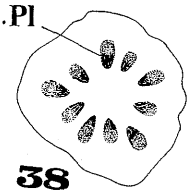

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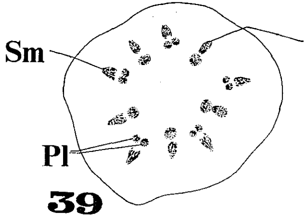

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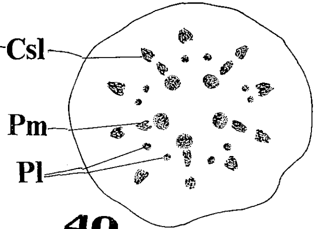

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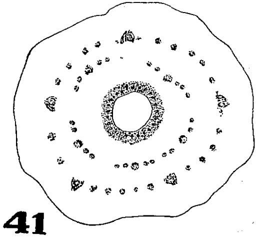

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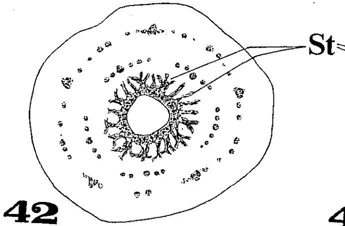

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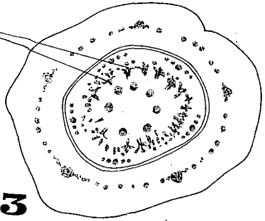

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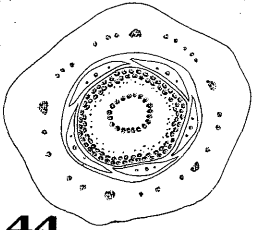

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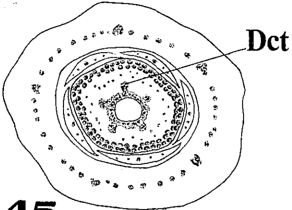

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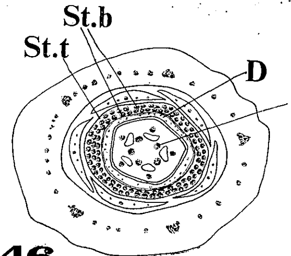

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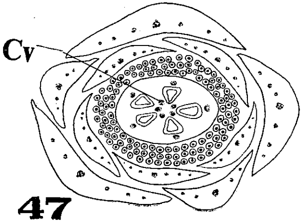

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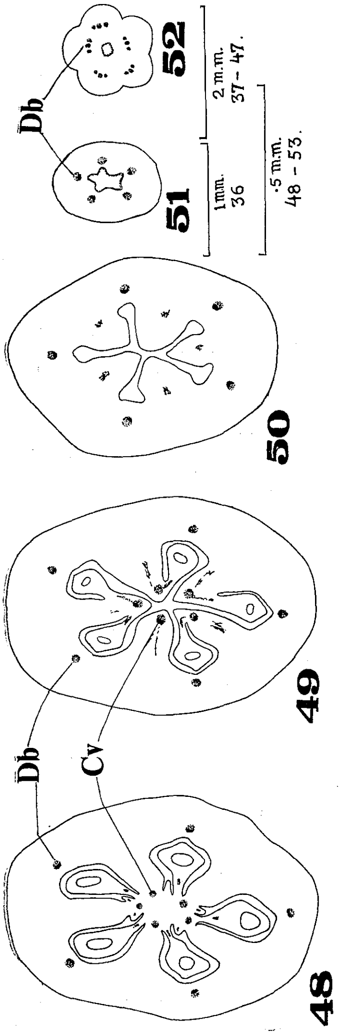

united below into a tube which receives vascular bundles formed by the chorisis of the staminal traces. The filaments of the stamens separate from the peripheral part of the tube, while the inner part of the tube forms the disc. Thus, the disc is interpreted as the inner sterilized part of the staminal tube.

The carpels are 3-traced. Both the ventral carpellary margins are fertile and each loculus shows two superposed ovules. The placentation is anatomically parietal. The style shows a stylar canal lined by transmitting tissue and only the dorsal carpellary bundles form the stylar supply.

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Explanation of figures

Abbreviation: Sm., sepal midrib; Sl., sepal lateral traces; C. Sl., common sepal lateral traces; Sm.+C. Pl., sepal midribs+common petal laterals; Pl., petal lateral traces; Pm., petal midrib; C. Pl., common petal laterals; St., staminal traces; St. t., staminal tube; St. b., staminal bundle; D., disc; Dct., dorsal carpellary trace; Cv., common ventrals; Db., dorsal bundles.

Figs. 1-18: *Vantanea parviflora*; 19-35: *V. macrocarpa*; 36-52: *V. minor*.

1, 19, 36: Semidiagrammatic longitudinal sections of flower buds showing the course of vascular bundles in the different floral parts. 2: Transverse section of the anther showing the loculi of the four fertile microsporangia. 3-18, 20-35, 37-52: Serial transverse sections of flowers showing the origin and distribution of the traces to the different floral parts. For each case see text.

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Literature cited

Cuatrecasas, J. 1961. A taxonomic revision of the Humiriaceae. Contr. U.S. Nat. Herb. **35**: 25–214. Eames, A.J. 1961. Morphology of Angiosperms. New York. Hutchinson, J. 1959. The Families of Flowering Plants. 1. London. Narayana, L.L. 1964. A contribution to the floral anatomy and embryology of Linaceae. J. Indian Bot. Soc. **43**: 343–357. Rao, D. & Narayana, L.L. 1965. Vascular anatomy of Humiriaceae. Curr. Sci. **34**: 383–384. Wilson, C.L. 1965. The floral anatomy of Dilleniaceae. 1. *Hibbertia* Andr. Phytomorphology **15**: 248–274.

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Humiriaceae の諸属の中，今回は *Vantanea* 属の 3 種の花部解剖の結果を報告する。アマ科植物と同じく，花は 5 数 5 輪性である。がく片は 3 葉跡を受けるが，其の中脈跡と花弁の共通側脈跡とが癒合する (*V. macrocarpa* と *V. minor*)。花弁は 3 葉跡を受ける。雄ずい圏には多数の分枝した維管束を生ずるが，これは Dilleniales の束生雄ずいとの関係を想わせる。単体雄ずいの内側に花盤が存在するが，これは花糸筒部の内側の変態によるものであり，花盤というものゝ起源の一つを仄示する。子房は 5 心皮 5 室，上方で 1 室となり，各室に上下に重なって 2 個ずつの胚珠が形成される。解剖学的に側膜胎座である。花柱は 1 本に癒合し，中空の内面は transmitting tissue に裏打され，心皮の背縫維管束が花柱脈になる。

□Robert S. Woods: **An English-Classical dictionary for the use of taxonomists.** pp. 331. Pomona College, Clarmont, California, U.S.A. 新らしい学名をつける場合はもちろんだが，古くついた学名の語源をさぐる場合などに，大変便利なので少し古いが御紹介する。英語で見出し語を与え，それに厳格に対応するギリシア語とラテン語とを挙げた辞書である。学名の語源をあげた類書もいくつかあるが，これは Liddell & Scott's Greek-English Lexicon と Andrew's Latin-English Lexicon とから，後年に意味がずれたりしたようなものを除いて，ギリシア・ローマの時代に使われた，そのもとの意味がはっきりしたものだけを集録したものという。ギリシア語はローマ字に置きなおしてあるのも便利。ひまがあるときひっくりかえすと成程とおどろくことがあるだろう。たとえばナシ (梨) のところをひくと，ギリシア語で Achras, Apios, Ochne の三つと，ラテンで Pirus とが出る。みな属名と関係があることが暗示されるなど。 (前川文夫)